

Appl. No. 09/976,927  
Arndt, dated June 11, 2003  
Reply to Office Action of September 11, 2003

PATENT

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

Claims 1.-28. (canceled).

Claim 29. (previously presented) A semiconductor device comprising:

- (a) a substrate;
- (b) a diffusion barrier layer, wherein the diffusion barrier layer comprises a self-assembled monolayer, wherein the self-assembled monolayer is a single layer of molecules, and wherein the molecules in the self-assembled monolayer have first ends attached to the substrate and second ends projecting upward from the substrate; and
- (c) a metal layer comprising copper on the diffusion barrier layer, wherein the copper in the metal layer is in direct contact with the second ends of the molecules in the self-assembled monolayer.

Claim 30. (previously presented) The semiconductor device of claim 29 wherein the device is capable of being biased at about 2 MV/cm at about 200 °C for about 30 minutes without diffusion of the copper into the substrate.

Claim 31. (previously presented) The semiconductor device of claim 29 wherein the substrate comprises silicon oxide on silicon.

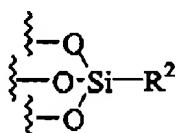
Claim 32. (previously presented) The semiconductor device of claim 29 wherein the molecules have aromatic groups at the first ends of the molecules.

Claim 33. (previously presented) The semiconductor device of claim 29 wherein the metal layer is formed by a sputtering process.

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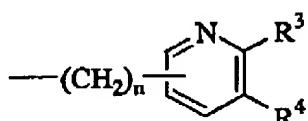
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Claim 34. (previously presented) The semiconductor device of claim 29, wherein the molecules comprise subunits of the following structure:



wherein R<sup>2</sup> is an alkyl group, heteroalkyl group, aryl group or heteroaryl group.

Claim 35. (previously presented) The semiconductor device of claim 34, wherein R<sup>2</sup> has the following structure:



wherein R<sup>3</sup> and R<sup>4</sup> are independently selected from the group consisting of hydrogen, alkyl groups, heteroalkyl groups, halo groups, NH<sub>2</sub>, NHR<sup>6</sup>, NR<sup>6</sup>R<sup>7</sup>, OH, OR<sup>6</sup>, SH, SR<sup>6</sup>, CHO, COOH and CN, and wherein R<sup>6</sup> and R<sup>7</sup> are alkyl groups, and wherein n is an integer ranging from 1 to 5.

Claim 36. (previously presented) The semiconductor device of claim 29 wherein the semiconductor device is an integrated circuit.

Claim 37. (new) The semiconductor device of claim 29 wherein the metal layer is formed by a vapor deposition process.